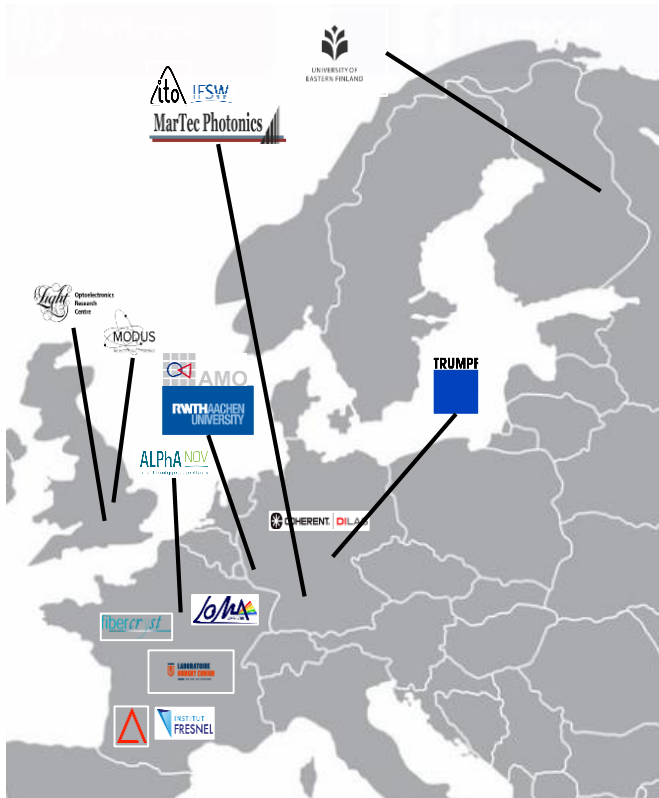


Partners

The project GREAT is organized by a consortium of renowned scientific institutions, academic partner organizations, as well as private sector partners, situated across Europe.

GREAT started in October 2019 and will be completed by the end of September 2022. 16 partners are involved coming from Finland, France, Germany and United Kingdom.



More information

Project Website
<https://itn-great.eu/>



Project Coordinator

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GREAT is a collaborative research project funded by the European Union's Horizon 2020 / Marie Skłodowska-Curie Actions, under grant agreement N° 813159.



Grating Reflectors Enabled laser Applications and Training

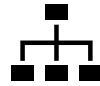


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Developing Grating Waveguide Structures (GWS) for tailoring the polarization and for realizing spectral and spatial beam shaping in high power laser systems.



Project



Work packages

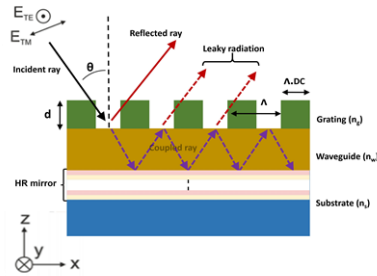


Applications

Mission GREAT

- The GREAT project is responding to a key challenge set by the ETP photonics21 : training highly skilled specialists to optimise laser system development and to implement innovative concepts.
- The GREAT project encompasses the full development chain for complex laser systems, stemming from the understanding of an end-user requirement.

Grating Waveguide Structures (GWS)



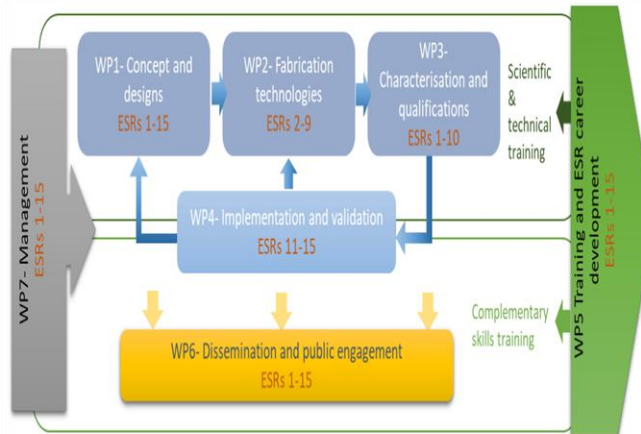
The GWS is a combination of a planar waveguide and sub-wavelength gratings. These optical elements are powerful solutions for tailoring the polarization and for realizing spectral and spatial beam shaping of high-power laser light.

Training objectives

- GREAT addresses key steps from concept, through production and precise characterisation, right up to implementation of sub-wavelength GWS.
- The project promotes and facilitates the acquisition of complementary skills applicable across sectors and disciplines.
- GREAT training will establish a collaborative network of highly skilled researchers to become future leaders in the photonics' field.

The project will target all essential steps in the entire development process of GWS.

The workpage model shall cover the entire development chain for GWS, starting with conceptualization through modelling and design, fabrication, qualification, and finally their implementation and testing within industrial settings.



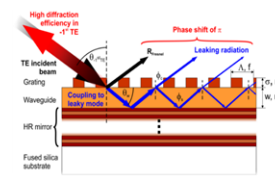
- WP1.** To provide design concepts.
- WP2.** Dedicated to the fabrication technologies.
- WP3.** Characterisation and qualification of GWS.
- WP4.** Testing and implementation of GWS in different laser systems.
- WP5.** Training and ESR career development.
- WP6.** Dissemination and public engagement.
- WP7.** Management of the project.

- GREAT will focus on implementing GWS for pulse compression, spectral stabilization and wavelength multiplexing, as well as, polarization shaping of laser light.
- The Key Performance Indicators (KPI) for the different applications, will be analysed in detail to verify the proper functionalities of the GWS inside the laser systems, for which they have been designed.

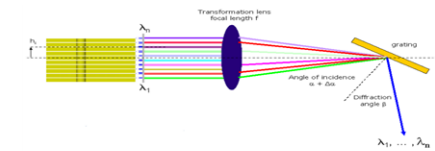
Pulse compression

In GREAT, pulse compressors based on GWS for the 1 and 2-micron wavelength regimes will be developed to address both high-average power and high-energy in the laser systems.

KPIs - Pulse duration, compression efficiency and spectral bandwidth



Spectral stabilization and Wavelength multiplexing



Wavelength stabilization with GWS mirrors will be explored in GREAT to provide narrow and stabilized spectral output in laser Intracavity. ESRs will also develop the required wavelength multiplexer GWS that will exhibit an overall combining efficiency of > 95%.

KPIs - Spectral bandwidth, SHG efficiency and combining efficiency

Polarization shaping

Beams with radial and azimuthal polarization have often been reported to be beneficial for many applications in physics and laser engineering. GREAT will address both the intra-cavity generation and extra-cavity conversion to high-power beams with radial or azimuthal polarization.

KPIs - Spatially resolved polarisation analysis, output power, beam quality factor and long term stability

